

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board

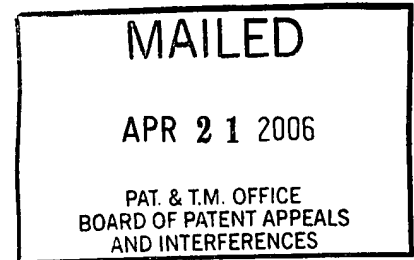
UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

Ex parte TOREN S. DAVIS

Appeal No. 2006-0651  
Application No. 10/050,061

ON BRIEF



Before FRANKFORT, MCQUADE, and BAHR, Administrative Patent Judges.

MCQUADE, Administrative Patent Judge.

DECISION ON APPEAL

Toren S. Davis appeals from the final rejection (mailed January 13, 2005) of claims 5, 7-10 and 12-14, all of the claims pending in the application.

THE INVENTION

The invention relates to a tuned mass damper designed to counteract mechanical vibrations. Representative claims 5, 8 and 9 read as follows:

5. A tuned mass damper, comprising:  
a mass having predetermined inertia properties; and  
a plurality of isolators arranged in a hexapod configuration, each isolator having at least a first end and a second end, each isolator first end coupled to the mass and each isolator second end adapted to couple to a structure that may experience vibrations at particular frequencies and at particular locations on the structure in six independent degrees of freedom, wherein each of the isolators, in combination with the mass, is configured to be tuned independent of the other isolators to reduce a first particular frequency of the vibrations experienced by the structure at a first particular location on the structure.

8. The damper of claim 5, wherein:  
each isolator comprises a spring having an adjustable spring constant;  
each isolator second end is adapted to couple to the structure at a predetermined location thereon; and  
each isolator is individually tuned by adjusting its spring constant and the predetermined location on the structure to which its second end will couple.

9. The damper of claim 5, wherein each isolator comprises:  
a tubular damping strut coupled between the isolator first and second ends;  
a first spherical pivot coupled to the isolator first end;  
and  
a second spherical pivot coupled to the isolator second end.

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#### THE PRIOR ART

The references relied on by the examiner to support the final rejection are:

Cunningham et al. (Cunningham)	5,305,981	Apr. 26, 1994
Gran et al. (Gran)	6,022,005	Feb. 08, 2000
Griffin et al. (Griffin)	6,315,094	Nov. 13, 2001

#### THE REJECTIONS

Claims 5, 7, 10 and 12 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Griffin.

Claims 8 and 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Griffin in view of Cunningham.

Claims 9 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Griffin in view of Gran.

Attention is directed to the brief (filed February 21, 2005) and answer (mailed April 28, 2005) for the respective positions of the appellant and examiner regarding the merits of these rejections.<sup>1</sup>

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<sup>1</sup> In the final rejection and answer, the examiner mistakenly designates the statutory basis for the anticipation rejection of claims 5, 7, 10 and 12 as § 102(b) rather than § 102(e). Griffin, which has a patent date (November 13, 2001) less than one year prior to the filing date (January 15, 2002) of the instant application, is not prior art with respect to the subject matter on appeal under § 102(b), but is prior art under § 102(e). The examiner's oversight in this matter appears to have been inadvertent and does not prejudiced the appellant to any meaningful degree.

DISCUSSION

I. The 35 U.S.C. § 102(e) rejection of claims 5, 7, 10 and 12 as being anticipated by Griffin

Griffin discloses a passive "virtual" skyhook isolation system (shown generally in Figure 4) which is "used to isolate a system or machine from the transfer of mechanical vibrations to or from other systems or the environment" (column 2, lines 15-17). The "virtual" skyhook system differs from known skyhook systems (see Figure 1B) in that it utilizes a secondary tuned spring mass damper instead of an inertial reference frame. For purposes of the appealed rejections, the examiner focuses on the "virtual" skyhook embodiment shown in Figure 9 which "incorporates both rotational and translation isolation in multiple directions using a hexapod type suspension" (column 2, lines 54 and 55). As explained by Griffin, "[s]ince the hexapod suspension couples to rotation and translation in all three dimensions, the primary suspension and the secondary mass and suspension can be designed to attenuate disturbances, including moments, acting on the primary mass in any direction" (column 7, lines 22-27). The hexapod suspension involves six spring and

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viscous dampers/isolators of the sort shown in Figure 1A (see column 7, lines 14-17).

Anticipation is established only when a single prior art reference discloses, expressly or under principles of inherency, each and every element of a claimed invention. RCA Corp. v. Applied Digital Data Sys., Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984). In other words, there must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. Scripps Clinic & Research Found. v. Genentech Inc., 927 F.2d 1565, 1576, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991).

As indicated above, independent claim 5 defines each of the isolators recited therein as being "configured to be tuned independent of the other isolators." Independent claim 10 recites the same limitation. In response to the appellant's ostensibly accurate observation (see pages 8-10 in the brief) that Griffin does not describe any of the isolators contained in the hexapod type suspension disclosed therein as configured to be tuned, the examiner states that

Applicant's "Summary" on page 2 of the specification refer[s] to Prior Art [i.e., the Cunningham patent] which specifically discloses wherein the prior art teaches wherein struts can be adjusted and decoupled from each other by changing "strut" angles, stiffness,

damping, and the TMD mass properties. As disclosed by Applicant, tuning struts is extremely well known in the art as ANY damper is inherently tuned to the specific requirements of the application for which it is used. The inherent design of a strut construction would result in "tuning" the strut to operate according to desired characteristics. Griffin et al. clearly discloses tuning in column 7, lines 17-29 and Column 1, line 67-Column 2, line 9 [answer, page 5].

It is of no moment, however, that Cunningham discloses isolators or struts which are configured to be tuned. The anticipation rejection at hand rests on Griffin alone, and Griffin simply does not teach isolators which are "configured to be tuned" in the sense set forth in claims 5 and 10. The examiner's implication that any damper or isolator, including those disclosed by Griffin, meets the "configured to be tuned" limitations because it is inherently "tuned" as manufactured to meet specific requirements and desired characteristics is not well taken. Although an isolator arguably is inherently "tuned" to function in a desired manner when made, this does not mean that it is "configured to be tuned." The appellant's specification (see pages 2 and 4) clearly sets forth the difference between the two through its contrasting discussions of a tuned mass damper which is adjusted at the factory by changing springs or removing material from the oscillating mass based on estimates of the frequency of the device to be damped (i.e., an

isolator which is "tuned") and of a strut or isolator which can be finely tuned by adjusting its respective spring constant and mounting location on a particular structure to be damped (i.e., an isolator which is "configured to be tuned").

Thus, Griffin does not disclose each and every element of the subject matter recited in claims 5 and 10. Consequently, we shall not sustain the standing 35 U.S.C. § 102(e) rejection of independent claims 5 and 10, and dependent claims 7 and 12, as being anticipated by Griffin.

II. The 35 U.S.C. § 103(a) rejection of claims 8 and 13 as being unpatentable over Griffin in view of Cunningham

Acknowledging that Griffin does not respond to the limitations in claim 8, or to the corresponding limitations in claim 13 (which depends from claim 10), relating to the spring with an adjustable spring constant, the examiner turns to Cunningham.

Cunningham discloses a "vibration isolating and damping apparatus that passively isolates vibrations between a supporting structure and a supported structure while permitting movement of the supported structure over six degrees of freedom with respect to the supporting structure" (column 2, lines 22-27). In the exemplary embodiment described, the supported structure comprises

a reaction wheel assembly mounted on a cradle 12 and the supporting structure comprises a base 10. Six viscous isolators 14 arranged in a symmetrical pattern of three isolator pairs spaced  $120^\circ$  apart link the cradle to the base. Each isolator, whose basic construction is illustrated in Figure 3, includes flexible joints 20 for connection to the cradle and base. These joints may take the form of spherical bearings or two-axis flexures (see column 5, lines 6-10). The isolators also include fluid damping structure, and a coil spring which can be adjusted or tuned to optimize the isolator for performance along one degree of freedom (see column 6, lines 28-36; column 7, lines 19-21; and column 9, lines 24-27). In Cunningham's words, "the deterministic design of the isolators allows calculation to establish the required amount of damping and the required stiffness of the elastic [isolator] members when given the force, direction of force, frequency range, amplitudes and directions of vibrations to be expected" (column 8, lines 43-48).

The appellant does not dispute that it would have been obvious to utilize Cunningham's isolators to implement Griffin's broadly disclosed hexapod suspension, or that such isolators are



"configured to be tuned" as recited in parent claims 5 and 10.<sup>2</sup> The appellant does contend, however, that the rejection of claims 8 and 13 is unsound because the combined teachings of Griffin and Cunningham would not have suggested a system meeting the limitations in these claims, and in parent claims 1 and 5, pertaining to the coupling of each isolator second end to the structure at a predetermined or particular location to reduce vibrations at that location. The appellant has failed to cogently explain, however, and it is not apparent, why the second ends of the isolators resulting from the proposed combination of Griffin and Cunningham are not so coupled, why these second ends are not capable of such coupling, or why the coupling would not reduce vibrations at the coupling location.

Thus, the combined teachings of Griffin and Cunningham justify the examiner's conclusion that the differences between the subject matter recited in claims 8 and 13 and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. Accordingly, we shall sustain the

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<sup>2</sup> Indeed, the appellant's specification (see page 2) cites Cunningham for its disclosure of such tunable isolators.

standing 35 U.S.C. § 103(a) rejection of claims 8 and 13 as being unpatentable over Griffin in view of Cunningham.

III. The 35 U.S.C. § 103(a) rejection of claims 9 and 14 as being unpatentable over Griffin in view of Gran

Conceding that Griffin does not meet the limitations in claim 9, or the corresponding limitations in claim 14 (which depends from claim 10), requiring each isolator to comprise a tubular damping strut and first and second spherical pivots, the examiner looks to Gran.

Gran discloses a vibration isolation device for reducing vibrational disturbances of precision equipment mounted on a payload platform which is subject to vibrations transmitted from a base platform. Three pairs of semi-active isolators 14 support the payload platform 10 on the base platform 12. Each isolator 14, which is pivotally connected at spherical ends to the payload and base platforms (see Figures 2 and 6), comprises a passive spring, preferably a slotted cylinder 22, and an active damping component, preferably a voice coil actuator 24, mounted parallel to the passive spring. A control system 58 for actuating the voice coil actuators in response to sensed vibrations includes six damping and isolation control loops 62 corresponding to the six isolators.

The appellant does not dispute that it would have been obvious to utilize Gran's isolators to implement Griffin's broadly disclosed hexapod suspension, or that such semi-active isolators are "configured to be tuned" as broadly recited in parent claims 5 and 10. The appellant does submit, however, that the rejection of claims 9 and 14 is untenable because the combined teachings of Griffin and Gran would not have suggested a system meeting the limitations in parent claims 1 and 5 pertaining to the coupling of each isolator second end to the structure at a particular location to reduce vibrations at that location. The appellant has failed to cogently point out, however, and it is not evident, why the second ends of the isolators resulting from the proposed combination of Griffin and Gran are not so coupled, why these second ends are not capable of such coupling, or why the coupling would not reduce vibrations at the coupling location.

Hence, the combined teachings of Griffin and Gran warrant the examiner's conclusion that the differences between the subject matter recited in claims 9 and 14 and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. Accordingly, we shall sustain the standing 35

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U.S.C. § 103(a) rejection of claims 9 and 14 as being  
unpatentable over Griffin in view of Gran.

IV. Remand to the examiner

This application is remanded to the examiner pursuant to 37  
CFR § 41.50(a)(1) for consideration of the following matters.

The conclusion that it would have been obvious to use the  
particular isolators disclosed by either Cunningham or Gran in  
the hexapod suspension disclosed by Griffin is reasonable on its  
face and, as indicated above, has not been challenged by the  
appellant. On remand, the examiner should consider whether the  
combined teachings of Griffin and Cunningham justify a 35 U.S.C.  
§ 103(a) rejection of claims 5, 7, 9, 10, 12 and 14, and whether  
the combined teachings of Griffin and Gran warrant a 35 U.S.C.  
§ 103(a) rejection of claims 5, 7, 10 and 12.

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SUMMARY

The decision of the examiner to reject claims 5, 7-10 and 12-14 is affirmed with respect to claims 8, 9, 13 and 14, and reversed with respect to claims 5, 7, 10 and 12. In addition, the application is remanded to the examiner for further consideration.

In addition to affirming the examiner's rejection of one or more claims, this decision contains a remand. 37 CFR § 41.50(e) provides that

[w]henver a decision of the Board includes a remand, that decision shall not be considered final for judicial review. When appropriate, upon conclusion of proceedings on remand before the examiner, the Board may enter an order otherwise making its decision final for judicial review.

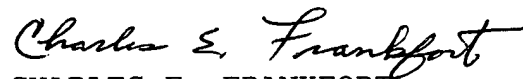
Regarding any affirmed rejection, 37 CFR § 41.52(a)(1) provides "[a]ppellant may file a single request for rehearing within two months of the date of the original decision of the Board."

The effective date of the affirmance is deferred until conclusion of the proceedings before the examiner unless, as a mere incident to the limited proceedings, the affirmed rejection is overcome. If the proceedings before the examiner do not result in allowance of the application, abandonment or a second

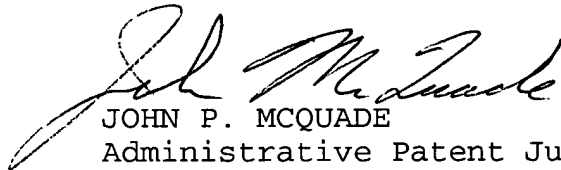
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appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejections, including any timely request for rehearing thereof.

AFFIRMED-IN-PART AND REMANDED



CHARLES E. FRANKFORT )  
Administrative Patent Judge )



JOHN P. MCQUADE )  
Administrative Patent Judge )



JENNIFER D. BAHR )  
Administrative Patent Judge )

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